

# **Prevention and Control of Disease Transmission from Wildlife:**

## **Challenges and Implications**

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# **Emerging Interest: Wildlife Related to Public Health**

- 1992 - Institute of Medicine Report on emerging infections
  - Recently increased incidence
  - Recently increased geographic range
  - Recently discovered
  - Caused by newly evolved pathogens
  - (Moved into new species)
- 1990's - Escalation of bioterrorism fears

# Emerging Interest in Wildlife Related to Public Health

- 1,415 known human pathogens
  - 61% zoonotic
- Pathogens causing emerging infectious diseases
  - 75% zoonotic
  - Wildlife increasingly important source
- Most bioterrorism agents are zoonoses with wildlife component

# Selected Emerging Infectious Diseases Associated with Wildlife

- Bats - SARS, Hendra, and Nipah virus
- Birds - West Nile virus, avian flu
- Non-human primates – Ebola, HIV/AIDS
- Rodents – hantavirus, monkeypox, lymphocytic choriomeningitis
- Raccoons, bats and skunks - rabies

# Definitions Of Challenge

- A summons that is often threatening, provocative, stimulating, or inciting (summons to a duel).
- An invitation to compete in a sport.
- A calling to account or into question.
- A stimulating or interesting task or problem.

# Definitions of Implicate

- Archaic = to fold or twist together: interweave
- To involve as a consequence, corollary or natural inference.
- To bring into intimate or incriminating connection.

# Definition of Implication

- Close connection, relationship or involvement as from:
  - Long association,
  - Logical inevitability
  - Intimate accompaniment

# Qualifiers/Limitations

- Incomplete
- Much overlap/interdependency
- Implications can also be challenges
- Smorgasbord of select examples

# Public Health Challenge: Identify & Employ Methods to Protect Humans

- Prevent/control wildlife disease
- Intervene at human/animal/environmental interface
  - Direct contact – wild, captive
  - Infected domestic animals
    - Infected vectors
    - Contaminated food, water, animal products



# One Science

- Rabies – wildlife biologists, animal control officers
- Ebola – US Army Medical Research Institute for Infectious Diseases
- Pfiesteria (harmful algal blooms) – phylogenists, psychologists
- West Nile virus - entomologists

# Disease Surveillance Challenges

## Human and Animal

- Recognition of disease
  - Reliable observers (first detectors)
  - Laboratories
    - Accessible, reliable
    - Accurate tests available
- Reporting/Collecting data
  - Timely
  - User-friendly/efficient systems
  - Integration of comparable animal & human data

# Disease Surveillance Challenges

- Analyses
  - Timely
  - Appropriate
- Sharing data/results/conclusions
  - Timely
  - Secure (pre-publication)
  - Include all stakeholders

# Ecological Challenges

- Wildlife adaptation
  - Urban/suburban raccoons and rabies
- Suburban encroachment
  - Deer, ticks and Lyme disease
- Concentrated feeding
  - Deer and TB, CWD
- Captive wildlife
  - Zoos and TB
  - Hunting preserves, coyotes and rabies



# Wildlife Movement Challenges

- Translocation
  - Raccoons & rabies: hunters, pest control operators
  - Foxes & *Echinococcus multilocularis*
- Importation – legal and illegal
  - Birds and chlamydiosis (psittacosis)
  - Rodents and monkeypox
- Commercialization
  - Non-human primates and Ebola virus
  - Pet trade, swap meets

# Special Human Health Challenges

- Increase in compromised immunity population
  - More susceptible persons, severe disease
  - Sentinels (e.g., cryptosporidiosis)
- Seniors – increasing population (with pets?)
- Children – less exposure, experience = less immunity, understanding?
- Mental health issues – hoarders, emotional response to control efforts, e.g. depopulation
- Health care access
  - Availability of knowledgeable health care providers

# Psycho-Social Challenges

- Personalities
- Turf protection or ‘turfing’
- Perception
- Beliefs
- Will

# Communication Challenges

- Multiple target audiences
- Opposing viewpoints
  - Hunters vs. animal rights groups
- Media – help or hinder efforts
- Cultural differences
- Many languages other than English

# Targets/Stakeholders

Agriculture Agencies	Farmers, Other Producers
Public Health Agencies	Wildlife rehabilitators
Wildlife Agencies	Hunters/trappers
Environmental Agencies	Politicians
Animal Control Agencies	Media
Animal Welfare Organizations	Importers
Animal Rights Organizations	Pet Shop Operators
Human Medical Care	Zoo Managers
Animal Medical Care	Nuisance Wildlife Operators
Academia	Public
Military	

## Applied and Basic Research Needs

- Financial resources
- Trained/experienced personnel – field/bench
- Training venues – academic, practical
- Qualified, equipped laboratories

# Resource Challenges

- Funding
  - Too little
  - Misdirected (disease du jour)
  - Time limits
- Bureaucracy
  - Slow response time
  - Different priorities
- Political Reality
  - Often works against comprehensive, integrated systems

# Some Examples of Meeting the Challenges

# A Small Test

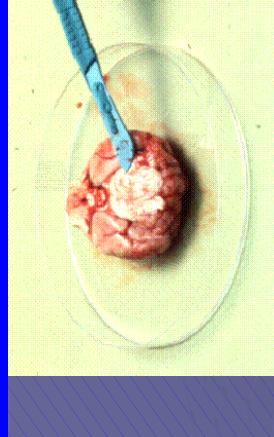
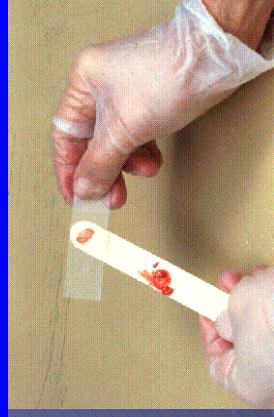
- Wildlife Center veterinarian calls health department about pox lesions on squirrels (probably squirrel pox, but a little odd)
  - Public Health laboratory willing to test (want to try out new pox testing capability)
- PHL instructs veterinarian on sample collection
- Wildlife Center delivers specimens to local health department
  - LHD ships over night to PHL via lab courier

## A Small Test, continued

- It was squirrel pox, but system was tested and worked
- First detector – high level of suspicion, acted
- Health Department – coordinated, communicated
- Laboratory – ability, will & courier system
- Should not be remarkable

# Laboratory Collaboration

- Availability of regional laboratories
- Rabies negative brains of cattle sent to NVSL for BSE testing
- Equine rabies suspects tested for arboviruses and vice versa



# Wildlife Rabies, U.S.



# Rabies

- Effective, long-term, public health program
- Emerging disease
  - Raccoon rabies – new species/geographic area
  - Recent human cases from bat virus variants
  - Skunk outbreak in Arizona from bat variant
- Innovations
  - Oral vaccine for wildlife
  - RabID – CDC's GIS-based surveillance mapping
  - Field test used by USDA WS
  - Human treatment possibility

# Bat Rabies in Skunks, Flagstaff, Arizona

- Coordinated laboratory-based disease surveillance program
  - Test sick/dead wildlife for potential zoonoses (human/pet exposures not necessary)
- Citizen reported dead skunk to animal control
  - AZ State Health Lab test positive
  - Tissues sent to Texas Health Lab for variant test
    - First time bat variant maintained in terrestrial population (19/145 skunks infected)

## Bat Rabies in Skunks, Arizona, cont.

- Task Force established
- Relocation of nuisance skunks prohibited
- Comprehensive public education
- Rabies vaccination clinics for pets
- Emergency quarantine for pets
- USDA Wildlife Services & CDC: trap, vaccinate, release skunks (n = 217)

# Bat Rabies in Skunks, Arizona, cont.

- Students: neighborhood leaflets
- Veterinarians: free pet vaccinations
- Animal control (city & county): public calls
- Public Health Lab: surge capacity
- Police: equipment storage space
- Game and Fish: public calls and euthanasia
- Humane Society: euthanasia
- Media – good public education
- Local health department: coordinated feral cat quarantine

# Bat Rabies in Skunks, Arizona, cont.

- First detectors: citizens
- Responsive government agencies
  - Appropriate lab testing available
- Cooperation: federal/state/local governments/other organizations
  - Parenteral vaccination of skunks – spinoff from oral vac program
  - Excellent media relations

# USDA Wildlife Services

- Oral vaccination of wildlife (> 10 years, 15 states)
  - + Political will = \$\$ (TX, NY)
  - + Involve other federal agencies, states, locals
  - + Annual planning meeting
- Research – scientific basis for activities

# Silos, Gaps and Overlaps

# Animal Importation

- Fragmentation at every level
  - Jurisdictions
  - Authorities
  - Statutes
- 200 different government offices and programs respond to 5 zoonotic diseases
- Big business
  - Reston, VA Ebola outbreak
  - Global trade – pets, food, etc.

# Surveillance

- + Veterinarians hired with CDC, USDA BT funds to improve animal disease surveillance (integrate with public health)
  - More oriented to agriculture than wildlife
- + /- Health departments requiring reporting of animals with zoonotic diseases
  - ? Duplicate
  - ? Integrated
  - ? Follow up
- + /- Integrated National Zoonoses Surveillance System

# Surveillance

- BT funds to public health laboratories
  - + /- Some funneled to agriculture agencies
  - Any to wildlife agencies?
  - Focused on BT agents
- Avian Flu
  - + Bringing wildlife, agriculture and health agencies to same table

# Whose Job Is It, Anyway?

- Sick dog at airport question
  - Who examines, quarantines, pays?
- Virginia prairie dogs during monkeypox outbreak
  - Game & Fish ban on ownership
  - VA animals were in transit - technically legal
  - Not an Agriculture issue

# VA Partial Answer to Animals that Drop Through the Gaps

- Quarantine and Isolation Law and Regulations
  - Gives power to health commissioner if communicable disease of public health threat
  - Defines “individual” as including companion animals
- Defines “companion animals” as those not regulated by other agencies
- Does not address who actually investigates, enforces

# Authority vs. Ability and Will

- Need memos of understanding if laws and regulations do not apply
- Cannot have written plans for every eventuality
- Depends on willingness of agencies and individuals to act
- Requires established relationships, regular meetings (interagency task force, work group)

# Communication/Data Sharing Pluses and Minuses

# ArboNET: Arbovirus National Surveillance System

- + All indicators – human (cases/blood donors), horses, other mammals, mosquitoes, dead birds, sentinel chickens,
- + Timely
- + Accessible
- Separate effort (silo)
- Sustainability/Funding
  - State silos – Agriculture, laboratories, mosquito surveillance, academia
- + All states contribute
- + Zoo Surveillance

# ProMED

- + Global
  - Depends on contributors
- + Includes animal diseases
  - Not comprehensive
- + Early warnings
  - Not surveillance
- + Control of disease

# Other Communication Venues

- EpiX – CDC, limited PH audience
- MMWR – web available to public
- Emerging Infectious Diseases Journal – same
- CDC monthly zoonoses conference calls
- NASPHV listserv
- CNN



# Zoonoses Clearing House?

- ArboNET and NASPHV as examples
- Web based with email alerts for selected topics
  - E.g. wildlife, parasites, current research projects
- Exchange ideas, what works and doesn't
- Fulltime, professional staff
- Open to all stakeholders – not just medical professionals

# National Weaknesses

## EPJ Gibbs in British Medical Journal

- Lack national program to prevent/control diseases that impact humans/animals/food.
- No coordinated effort or single agency with a ‘command and control’ responsibility.
- Lack of effective public communication.
- Disease surveillance systems not linked.

## National Weaknesses, cont.

- BT funding has not adequately supported programs against zoonotic disease threats.
- Fragmentation of jurisdictions, authorities, statutes and research.
- Animal and public health separated by culture and organization

# Major Happenings Start Small

- One person engaging and energizing others
- Organizations (local/national) picking up the call and working together
- An educated media, educating the public
- Politicians being convinced it is to their benefit to act

# Act Locally, Nationally, Globally

- Engage the individuals and organizations that can help improve surveillance, training communication, funding, etc.
- Provide reasonable, reliable, scientific information to your elected officials
- Become a trusted resource for the media
- Educate and advocate
- Communicate, collaborate, coordinate

# Be A “Consilient Thinker”

- An old word recently revived by E.O. Wilson and used to describe John Snow
- Combined insights from different disciplines and different scales of investigation
  - Microscopic exam of water samples
  - Weekly statistics of cholera deaths
  - Geographic patterns
  - Walking distance to Broad Street pump

Today  
Problems more complex  
Technical advances huge

Greater Need for Consilient Thinkers

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